

Perioperative Management of Cardiovascular Medications

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Perioperative Management

Overview

- **Learning objectives**
- **Beta-blockers**
- **Statins**
- **Alpha-2 agonists**
- **Calcium channel blockers**
- **ACE inhibitors and ARB's**
- **Anticoagulants**
- **Antiplatelet agents**
- **Clinical case scenarios**

Abbreviations

- **ACC: American College of Cardiology**
- **AHA: American Heart Association**
- **ACE : Angiotensin-converting enzyme**
- **ARB: Angiotensin receptor blocker**
- **MACE: Major adverse cardiac event(s)**

(cont.)

Abbreviations (cont.)

- **RCRI: Revised Cardiac Risk Index**
- **ACS: Acute coronary syndrome**
- **PCI: Percutaneous coronary intervention**
- **DAPT: Dual antiplatelet therapy**
- **BMS: Bare metal stent**
- **DES: Drug-eluting stent**

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Learning Objectives

1. Discuss the perioperative management of the following classes of medication in patients undergoing noncardiac surgery:
 - Beta-blockers
 - Statins
 - Alpha-2 agonists
 - Calcium channel blockers
 - ACE inhibitors and ARB's
 - Anticoagulants
 - Antiplatelet agents

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Learning Objectives (cont.)

2. Apply this information to clinical scenarios.

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Beta-blockers

- **Based on most recent ACC/AHA guidelines:**
 - **Should *not* be initiated on the day of surgery!**
 - **Should be continued in patients who have been on beta-blockers chronically**
 - **It *may be reasonable* to begin β -blockers preoperatively*:**
 - **In patients with intermediate- (moderate) or high-risk myocardial ischemia noted on preoperative stress testing**
 - **In patients with 3 or more RCRI risk factors**
- *may be started 2-7 days prior to surgery, although few data suggest starting β -blockers > 30 days prior to surgery is preferred

Revised Cardiac Risk Index⁷

Two or more of the following risk factors make a patient "high risk."

High-risk surgery (intraperitoneal, intrathoracic, or supra-inguinal vascular procedures)

History of ischemic heart disease

History of congestive heart failure

History of cerebrovascular disease

Preoperative treatment with insulin

Preoperative serum creatinine >2.0 mg/dL

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Statins

- **Based on most recent ACC/AHA guidelines:**
 - **Should be continued in patients who have been on statins chronically**
 - ***It is reasonable to begin statins preoperatively in patients undergoing vascular surgery.***
 - **Preoperative initiation of statin therapy *may be considered* in patients scheduled for elevated-risk procedures who have clinical indications for initiation of statin therapy.**

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Alpha-2 agonists

- **Based on most recent ACC/AHA guidelines:**
 - **Preoperative initiation of an alpha-2 agonist for prevention of cardiac events *is not recommended.***

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Calcium channel blockers

- Based on most recent ACC/AHA guidelines:
 - Limited data
 - “A large-scale trial is needed to define the value of these agents.”

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ACE inhibitors and ARB's

- Based on most recent ACC/AHA guidelines:
 - *It is reasonable to continue these agents perioperatively.*
 - *If they are held before surgery, it is reasonable to restart them as soon as clinically feasible postoperatively.*

PERIOPERATIVE MEDICAL INTERVENTION WHEN CONSIDERING NONCARDIAC SURGERY				
Beta-blockers <ul style="list-style-type: none"> • Start in intermediate- to high-risk patients • Should not start on day of surgery • Should not be withdrawn if taking chronically 	Statins <ul style="list-style-type: none"> • Continued if on chronically • Start in vascular surgery patients • Considered in patients with clinical indications, undergoing elevated-risk procedures 	Alpha agonist <ul style="list-style-type: none"> • Initiation not recommended prior to noncardiac surgery 	ACE inhibitor <ul style="list-style-type: none"> • Continued, or if held before surgery, restart postoperatively as soon as clinically feasible 	Aspirin <ul style="list-style-type: none"> • Continued when the risk of increased cardiac events outweighs the risk of increased bleeding

Patel, A.Y. et al. J Am Coll Cardiol. 2015; 66(19):2140-8.

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Anticoagulants

- **Based on most recent ACC/AHA guidelines:**
 - ***It is reasonable to continue anticoagulation throughout the perioperative period for low bleeding risk procedures.***
 - **For intermediate- and high-risk procedures, the timing of anticoagulant discontinuation and need for “bridging” therapy depends on the risk of thrombosis while off anticoagulants vs. procedural bleeding risk.**

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Anticoagulants (cont.)

- **Temporary interruption of oral anticoagulant therapy for invasive procedures:**
 - For nonvalvular atrial fibrillation, short-term interruption of oral anticoagulant therapy is safe for most patients, provided that they have not previously suffered a stroke.
 - For patients at higher thromboembolic risk who are undergoing high risk procedures, “bridging” with a parenteral anticoagulant becomes a stronger consideration.

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Anticoagulants (cont.)

- **Temporary interruption of oral anticoagulant therapy for invasive procedures (cont.):**
 - **Warfarin**
 - Number of days warfarin must be withheld prior to procedure depends on that individual’s usual maintenance dose
 - Check INR prior to procedure to assure subtherapeutic level
 - **Dabigatran**
 - If CrCl > 50 ml/min, stop dabigatran at least 1-2 days prior to procedure
 - If CrCl < 50 ml/min, stop dabigatran at least 3-5 days prior to procedure

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Anticoagulants (cont.)

- **Temporary interruption of oral anticoagulant therapy for invasive procedures (cont.):**
 - **Apixaban**
 - For moderate-high-bleeding risk procedures, stop apixaban at least 48 hours prior to the procedure.
 - For low bleeding-risk procedures, stop apixaban at least 24 hours prior to the procedure.
 - **Rivaroxaban & edoxaban**
 - Stop rivaroxaban and edoxaban at least 24 hours (\geq 48 hours for procedures in which hemostatic control is essential) prior to the procedure.



From: 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

J Am Coll Cardiol. 2014;63(22):e57-e185. doi:10.1016/j.jacc.2014.02.536

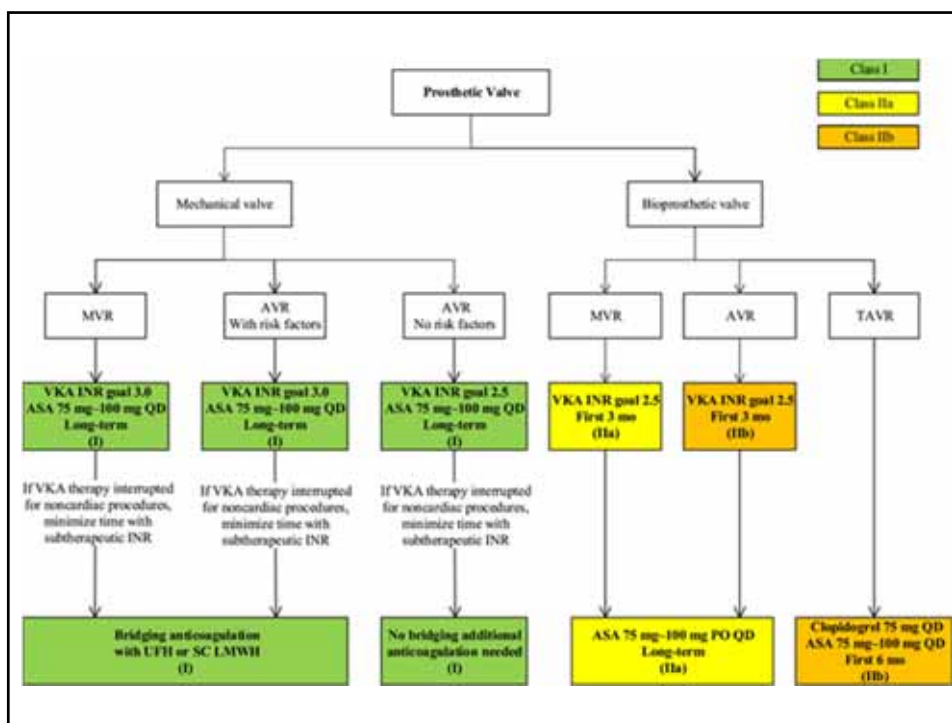
**Figure Legend:****Anticoagulation for Prosthetic Valves**

Risk factors include AF, previous thromboembolism, LV dysfunction, hypercoagulable condition, and older-generation mechanical AVR.

AF indicates atrial fibrillation; ASA, aspirin; AVR, aortic valve replacement; INR, international normalized ratio; LMWH, low-molecular-weight heparin; MVR, mitral valve replacement; PO, by mouth; QD, every day; SC, subcutaneous; TAVR, transcatheter aortic valve replacement; UFH, unfractionated heparin; and VKA, vitamin K antagonist.

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Anticoagulants (cont.)

“Risk factors” on previous slide include:

- Atrial fibrillation
- Previous thromboembolism
- LV dysfunction
- Hypercoagulable condition
- Older-generation mechanical valve prosthesis

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Antiplatelet agents

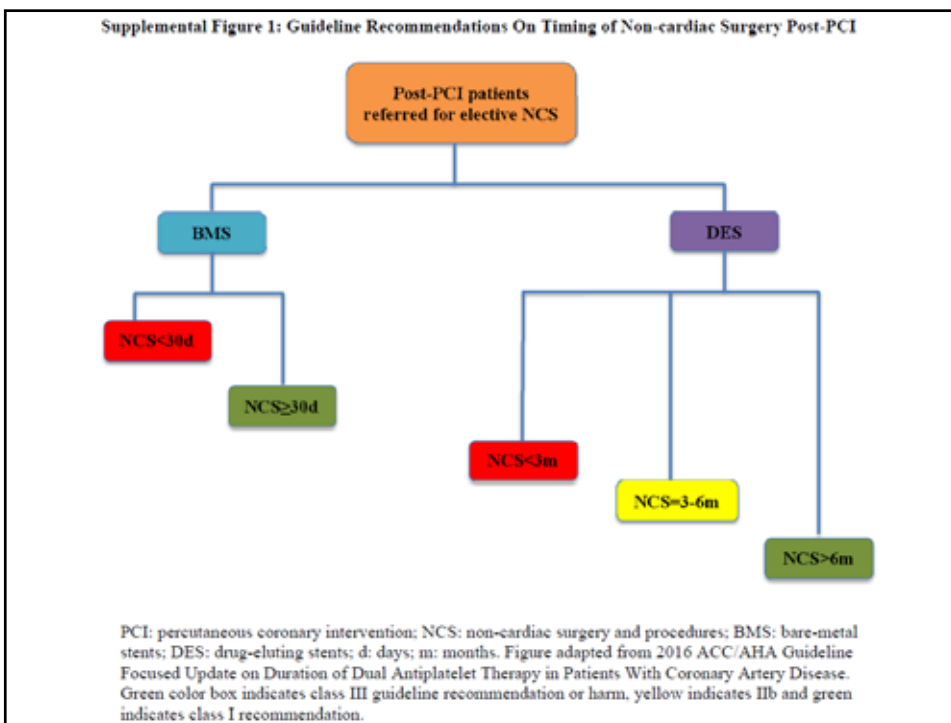
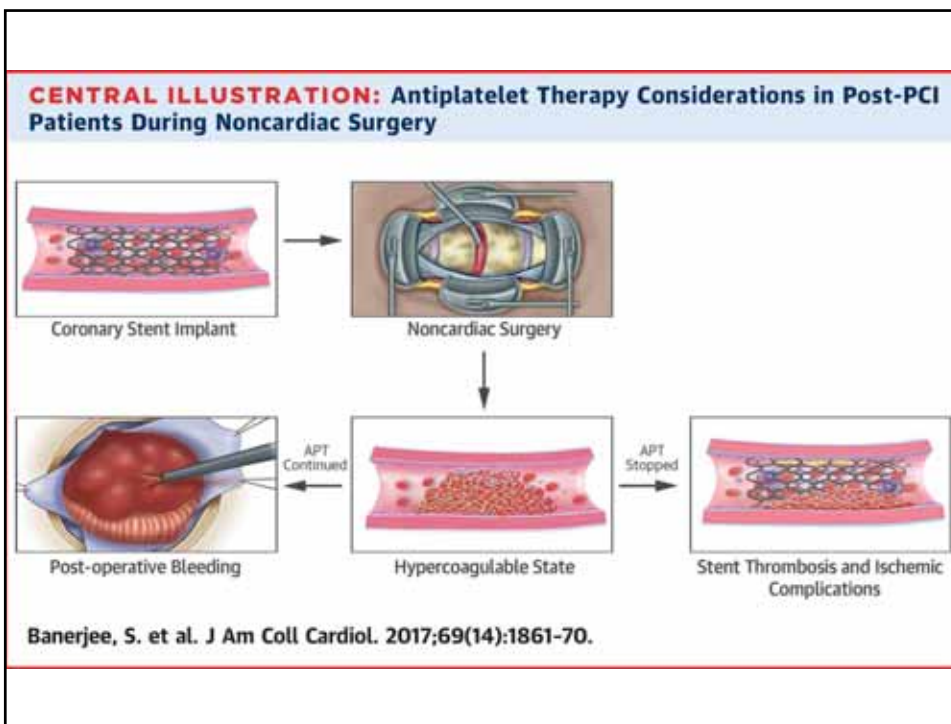
- **Based on most recent ACC/AHA guidelines:**
 - **For elective (non-urgent, non-emergent) noncardiac noncarotid surgery in patients who have *not* had previous coronary stenting:**
 - **Initiation or continuation aspirin is *not beneficial***
 - **“It *may be reasonable* to continue aspirin (low-dose) to continue aspirin when the risk of increased cardiac events outweighs the risk of increased bleeding.”**

(cont.)

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Antiplatelet agents

- **Based on most recent ACC/AHA guidelines:**
 - **For noncardiac surgery in patients who *have* previously undergone coronary stenting:**
 - **Elective surgery should be delayed ≥ 30 days after BMS implantation, and optimally ≥ 6 months after DES implantation.**
 - **In patients receiving DAPT after stenting who must undergo surgery that mandates the discontinuation of P2Y₁₂ inhibitor therapy, it is recommended that aspirin be continued if possible and the P2Y₁₂ inhibitor be restarted as soon as possible after surgery.**
 - **Elective surgery after DES implantation in patients undergoing procedures in which P2Y₁₂ inhibitor therapy will need to be discontinued *may be considered* after 3 months if the risk of further delay of surgery is greater than the expected risk of stent thrombosis.**



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ACC/AHA FOCUSED UPDATE

2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease

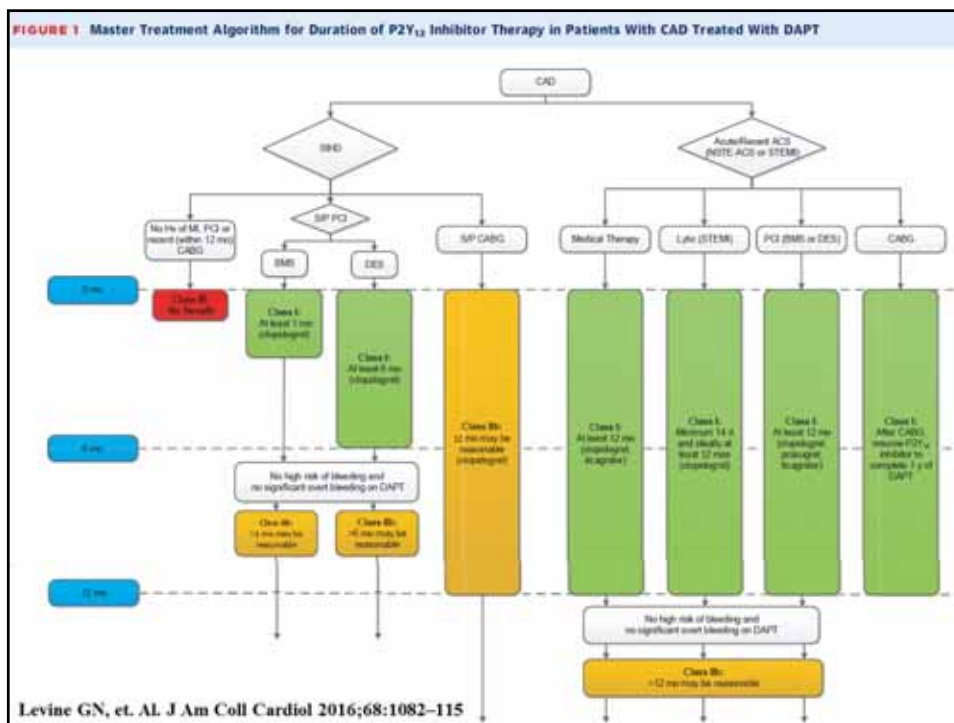
A Report of the American College of Cardiology/American Heart Association
 Task Force on Clinical Practice Guidelines

An Update of the 2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention,
 2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery, 2012 ACC/AHA/ACP/AATS/
 PCNA/SCAI/STS Guideline for the Diagnosis and Management of Patients With Stable Ischemic Heart
 Disease, 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction,
 2014 AHA/ACC Guideline for the Management of Patients With Non-ST-Elevation Acute Coronary
 Syndromes, and 2014 ACC/AHA Guideline on Perioperative Cardiovascular Evaluation and
 Management of Patients Undergoing Noncardiac Surgery

Developed in Collaboration With the American Association for Thoracic Surgery,
 American Society of Anesthesiologists, Society for Cardiovascular Angiography and Interventions,
 Society of Cardiovascular Anesthesiologists, and Society of Thoracic Surgeons.

Endorsed by Preventive Cardiovascular Nurses Association and Society for Vascular Surgery

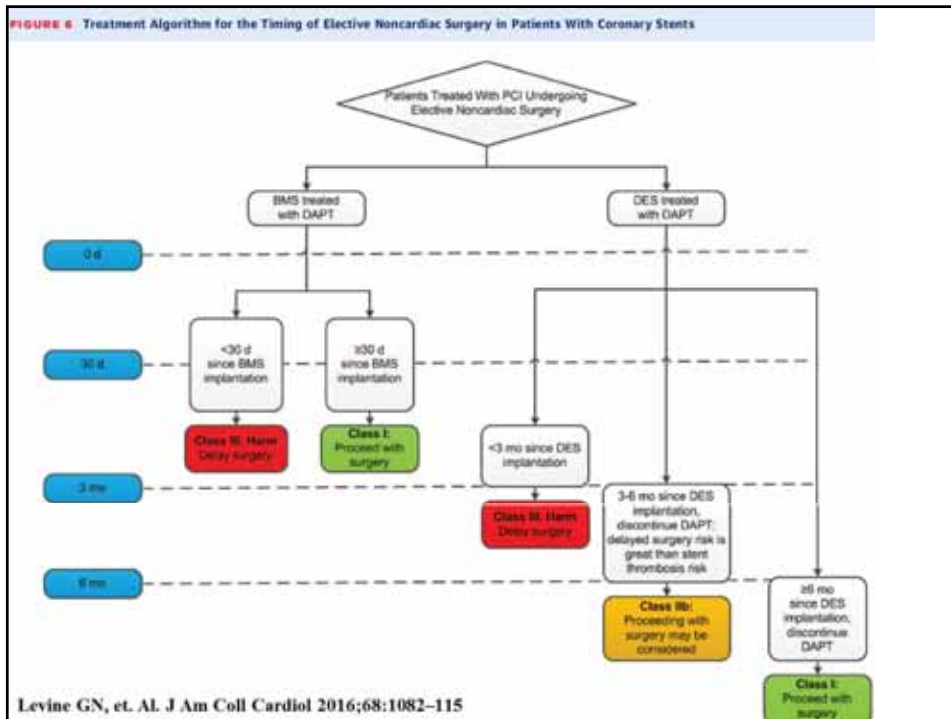
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Legend for the preceding figure:

Colors correspond to Class of Recommendation in Table 1. Clopidogrel is the only currently used P2Y₁₂ inhibitor studied in patients with SIHD undergoing PCI. Aspirin therapy is almost always continued indefinitely in patients with CAD. Patients with a history of ACS >1 year prior who have since remained free of recurrent ACS are considered to have transitioned to SIHD. In patients treated with DAPT after DES implantation who develop a high risk of bleeding (e.g., treatment with oral anticoagulant therapy), are at high risk of severe bleeding complication (e.g., major intracranial surgery), or develop significant over bleeding, discontinuation of P2Y₁₂ inhibitor therapy after 3 months for SIHD or after 6 months for ACS may be reasonable. Arrows at the bottom of the figure denote that the optimal duration of prolonged DAPT is not established. ACS indicates acute coronary syndrome; BMS, bare metal stent; CABG, coronary artery bypass graft surgery; CAD, coronary artery disease; DAPT, dual antiplatelet therapy; DES, drug-eluting stent; Hx, history; lytic, fibrinolytic therapy; NSTEMI-ACS, non-ST-elevation acute coronary syndrome; PCI, percutaneous coronary intervention; SIHD, stable ischemic heart disease; S/P, status post; and STEMI, ST-elevation myocardial infarction.

Levine GN, et. Al. J Am Coll Cardiol 2016;68:1082-115



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